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Mathematics News Letter

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Published in the interest of the **Louisiana-Mississippi Section of the Mathematical Association of America** and the **Louisiana-Mississippi Branch of the National Council of Teachers of Mathematics.**

A Challenge to Forward-looking Mathematics Teachers in the Colleges and High Schools of Louisiana and Mississippi.

Louisiana-Mississippi Section, Mathematical Association of America

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THE MATHEMATICS NEWS LETTER

We present a few reasons why all teachers of mathematics in the schools and colleges of Mississippi and Louisiana should support the News Letter.

(1) The growing mathematics teacher will not pass up an inexpensive aid to mathematical advancement.

(2) The subscription price of the Mathematics News Letter is 50 cents for one year, $1.00 for two years, or the price of two or four good movie entertainments.

(3) Estimating that there are at least 1,500 persons in the two States who have a professional interest in mathematics, 50 cents from each would bring in an amount sufficient to pay for doubling both the content of the News Letter and the number of its issues per year, and to pay for the cost of mailing it out to subscribers.

(4) With a sufficient number of paid-up subscriptions we will be in a position to petition effectively for second class mail privileges. This would mean an immense saving in the cost of distributing the Letter.

(5) The seven officials of the Section and the Council—named on the News Letter's title page—are undertaking to furnish at least once each month to the mathematics teachers of Louisiana and Mississippi a paper that shall be of distinct value to them—a value definable in terms both of professional stimulation and mathematical content.

(6) It is probably the only mathematical organ of the country that undertakes to represent equally the mathematical interests of both the college and the high school.

(7) A paper which gives out a message at least 10 times a year in the interest of increased local mathematical activity is the best possible guarantee for effective joint annual meetings of the Section and the Council.

(8) The News Letter proposes to be a vital artery of connection between local and national mathematical interests. As the latter are largely reflected in the journal of the National Council of Mathematics teachers and the Mathematical Association of America, namely, *The Mathematics Teacher* and the *American Mathematical Monthly*, respectively, one of the important functions of the News Letter will be to encourage the use of these journals in our territory.

(9) The Mathematics News Letter aims to furnish worthwhile mathematical information of every sort to its readers. This will include information about recent mathematical product, or recent additions to the influence of mathematics whether national or local; reports of M. A. of A. programs; sketches of distinguished mathematicians; indications of worth-while lines of mathematical investigation; what is being done mathematically in the Louisiana-Mississippi Section of M. A. of A., and the Louisiana - Mississippi Branch of the National Council, and who are doing it; up-to-date high school and college mathematical curricula; problems in the articulation of the high school and the college mathematics courses.

These are just a few of the reasons. The live teachers of mathematics need no more.

AN EXPLANATION AND AN INVITATION

In harmony with our policy of putting some mathematics into each issue of the News Letter we have repeatedly invited mathematics teachers of our territory to send us material for publication. It is because in many cases papers which we had been led to expect would be sent to us were not sent that we have been forced to rely upon our L. S. U. colleagues to help out. Professor H. L. Smith of the L. S. U. mathematics department who in the last News Letter contributed the elegant article entitled, "*A Brief Treatment of Analytical Trigonometry*," in this issue contributes "*The Straight Line in Analytics.*"

Professor W. Paul Webber, in characteristically lively style, writes on "*Freshman Mathematics in the Last Forty Years*". For the future we shall expect and we do hereby invite the mathematicians of all Louisiana and Mississippi colleges to cooperate with us in keeping the News Letter supplied with technical mathematical material.

The secondary material of the Letter will be furnished largely through Mrs. L. T. Longmire, secretary of the Louisiana-Mississippi Council. Mrs. Longmire will enlist the assistance of thoroughly competent people—among whom will be Professor W. D. Reeve of Teachers' College, Columbia University. A letter from Professor Reeve, printed in this issue expresses his desire to cooperate with us in every possible way.

In connection with the proposition to enlist the aid of Louisiana and Mississippi mathematicians it will be in order to publish a list of the college mathematics teachers of the two States. This list was furnished us by Dean J. A. Hardin of Centenary College.

The list of high school mathematics teachers will be published in subsequent issues by installments. On page 16 are the names of our college teachers of mathematics and the institutions with which they are connected.

MATHEMATICS AND ITS DEFINITIONS

The science which is basic to all others has a history so extensive, applications so numerous, and aspects so varied that those who have undertaken to define it have rarely agreed in their definitions. Peirce's, "it is the science of necessary conclusions"; W. B. Smith's, "it is the universal art apodeictic"; Poincare's, "it is the art of giving the same name to different things," are just a few of many more or less serious, more or less whimsical efforts at expressing in a sentence the inner essence of mathematics. The differences in these expressions have merely reflected the differences of the individual view-point, the latter having been doubtless, largely determined by differences in the special fields represented.

The great majority of mathematicians are indifferent to any definition of the science as a whole—a fact in interesting contrast to the fundamental part played by the Definition in the various separate branches of the science. Indeed, Professor W. B. Ford has very recently referred to a "special field of mathematics characterized as the domain in which we lay down definitions of things."

It may be true that out of the very multiplicity of aspects in which mathematical material—ordinarily so-called—may be viewed there can be built up an approximately satisfactory definition of the science—a definition which might, conceivably, be made to function with effect in the teaching or even in the extension of mathematics.

Without presuming to attempt such a definition it is never-theless interesting to consider the possibility of framing one that shall include, along with other

notions, that of a "totality of certain aspects of a thing." Every thing which has the property that it can be subjected to being viewed under these aspects could be classed as mathematical material.

By the use of such a definition a student might more or less early in his studies be led habitually to view his material in a variety of aspects—his doing so being no longer incidental or casual, but essential to a strictly mathematical view. In accord with this, his attention would be primarily directed to such facts as the following: 3 taken 7 times and 7 taken 3 times are but different aspects of 21; 5 taken 2 times is one aspect of 10, $(3+i)$ taken $(3-i)$ times is still another; $x^2+3x-4=0$ has equational, functional, number, vector, or geometric aspects. Under the equation aspect, it has two roots. Under the function aspect, x^2+3x-4 has two zeros. Viewed geometrically, $x^2+3x-4=0$ may be seen as two parallel straight lines. Regarded two - dimensionally $x^2+y^2=4$, may be seen as a circle, while under a three-dimensional aspect it can be shown as a cylinder. Projectively viewed the cross - ratio of four points is invariant. The formula $l=a+(n-1)d$, may be viewed as a constant, or under the aspect of four functions, each a function of three variables.

Thus, indefinitely.

The teaching significance of such a view - point would lie in its value for building into the student mind the habit of viewing mathematical material in many aspects rather than in one only.

MATHEMATICAL INTEREST GROWING

By J. A. HARDIN,
Vice-Chairman.

That there is an increasing interest in mathematics in Louisiana and Mississippi must now be apparent not only to teachers of mathematics, but to all who are to any great extent interested in the progress of education in the two States.

Nor has this quickened interest in mathematics been noted merely by the people within the two States. Mathematical leaders known nationally and internationally have observed it and are contributing to it their very valuable support. There is, moreover, some evidence that men and organizations in the field of commerce are interested observers of this new activity on the part of the mathematics people.

Four years ago there was no

organization of the mathematics teachers in Mississippi and Louisiana other than the mathematics sections of the two State Teachers Associations. Now there is an active section of the Mathematical Association of America and a Chapter, organized in March of this year, of the National Council of Teachers of Mathematics. The effect of the Section of the M. A. of A., particularly through its annual meetings, has been a new determination on the part of some mathematics teachers to increase their store of mathematical knowledge, and a new determination on the part of many to do more effective teaching of mathematics. There is some evidence, also, of increased activity in the direction of research in mathematics. The Chapter of the National Council holds tremendous possibilities of helpfulness, particularly to teachers of secondary mathematics. The two working together, and holding joint annual meetings should bring about a sure and steady progress in mathematical study and teaching in the two States, never before approximated.

Surely all mathematics teachers, who have not done so, will catch step and keep step in this movement. Surely everyone will join one or the other, or both of these organizations, keep informed as to the progress of both by reading the News Letter, and find some work to do in furthering the cause. If teachers of mathematics will show better evidence of our devotion to mathematics there will result a deeper interest in the study of mathematics in our schools and colleges, and a higher appraisal of mathematics by boards of trustees and boards of education.

PUSH MATHEMATICS TO THE FRONT

By H. FOX,
Vice-Chairman.

Mathematics can stand upon its own feet. To the informed it is an axiom that our present civilization cannot progress, cannot even exist without mathematics. Nevertheless, although this science will never be a dead one, we can make it even more lively by pushing it. There are some people who ought to know better, even some school people, who belittle the value of mathematics in the school curriculum. We must fight against any tendency to push the teaching of this science into the background. We know that the wheels of industry would stop, perhaps in the short space of a few days, if our engineers and scientists should sud-

denly forget all the mathematics they know. Botany and mathematics would seem to have little or nothing in common. Yet botanists are now using higher mathematics in their work. So it is with all scientific investigation. Mathematics is an indispensable tool.

We teachers who are trying to initiate the youth of the nation into the intricacies of this noblest of all the sciences should glory in our opportunities. We must have such an enthusiasm that we will go to any length to advance the cause in Mississippi and Louisiana and at the same time make ourselves more useful and efficient. To this end we should subscribe to the News Letter at once. Next we should make arrangements to attend the joint meeting of the Louisiana-Mississippi Section of the Mathematical Association of America and the National Council of Teachers of Mathematics in Jackson next spring. Thirdly, we should join one or both of the above societies at Jackson. Remember one does not have to be a member to attend the meeting.

We already have the livest scientific association in the two States. Let's get together and make it still greater.

SOME REASONS WHY TEACHERS SHOULD ATTEND THE COMING MEETING OF MISSISSIPPI-LOUISIANA MATHEMATICIANS

By W. C. ROATEN,
Chairman Louisiana-Mississippi Council.

The importance of the coming meeting of the mathematics teachers of Mississippi and Louisiana should make an appeal to all thinking people in the profession. But it is so easy to pass up such calls that attention of the teachers is directed to a few reasons why they should heed this particular call.

The tendency of teachers, especially teachers of mathematics, to grow stale is proverbial. Nothing is so deadening on the mind as the doing of the same thing, year after year, and too often of doing it in the same way. The average person has an idea that nothing is so dry as mathematics, and this feeling has had its reaction on the teachers of this subject, so that they too feel that mathematics is a dry subject and are consequently willing to let it so remain. This dry-as-dust notion shows itself in the class-room methods, the students missing the reaction that comes from the presentation of an important subject in an attractive manner. The coming together of the mathematics teachers in

such meetings as the Mathematics Association and Council have is calculated to clear the cobwebs from the minds of the teachers and send them back to their work with new thoughts and a higher conception of their duties.

In this same connection the fellowship offered by such gatherings is worthy of consideration. The teacher, by reason of the nature of his work, often feels the isolation of his position. The personal touch that results from the gathering of these men and women who are doing the same kind of work will go far to remove this feeling of loneliness and will send the teacher home with the feeling that he is a member of a great body of people who have the same burdens as himself.

While the subject of mathematics is as old as the race, many people apparently thinking that the subject long ago became crystallized—or, perhaps, fossilized is the word, it is a fact that no subject of study is today having a more profound bearing on our progress than the many applications of mathematics. Well may our scientists boast of their discoveries in their chosen field, but they would not deny that without their knowledge of mathematics much of that progress would be impossible. Nowhere is there a place better calculated to impress these facts upon the minds of the mathematics teachers than in the body of such an organization as ours where leading spirits in the profession are called upon to discuss such matters. Would not such contacts send us back to our school-rooms with a store of new thought with which to stimulate our pupils to greater endeavor?

For these and other reasons which might be adduced, it seems but reasonable to ask and to expect that a large number of the mathematics teachers of these two States should attend the coming meeting at Jackson.

AN APPEAL TO THE TEACHERS OF MATHEMATICS IN LOUISIANA AND MISSISSIPPI

By P. K. SMITH,
Secretary-Treasurer.

Why can't we put Louisiana and Mississippi on the mathematical map of the country?

Following the Shreveport meeting of the Section and Council we decided to send out a mathematical news letter. The chief purpose of the letter has been to engender interest and to furnish a medium for exchange of views on secondary and college mathematics. In a degree we have succeeded but have a long way to go toward making

the letter a vital organ. Professor Sanders, the editor, has not received the mathematical material that he should have had from high school or college people. This material need not necessarily be of research calibre, but if any teacher of either class has ideas of improvement in methods of presentation, or special solutions of interesting or difficult problems, they should communicate with Prof. Sanders.

Professor Sanders is giving his time and much more than his share of money. With his assistants he is attempting a far-reaching program for our two States. Fellow teachers we appeal to your local pride to co-operate in this piece of work. I am willing to give liberally to see this cause of the greatest of sciences go forward in this section of the country. I am willing to give liberally to see the program put upon a working basis. If we can receive sufficient financial aid to carry forward the work until the Jackson meeting, at that time, I believe we can establish financial machinery that will take care of the work.

If we can put the Mathematics News Letter on its financial legs, I believe, in time, that we shall be able to produce a real little organ devoted to our local mathematical problems. There is no doubt in my mind that we do have some real problems. Why shouldn't an organ of this kind have the support of high school and college teachers, school superintendents and college presidents? I am convinced that we have a worthy movement on foot.

We are asking each reader of the Mathematics News Letter to send fifty cents to help defray expenses. Some may feel able to send a dollar. Please send it, if you feel like it. If every reader will send fifty cents (some a dollar) we shall be able to cover the expenses of the Letter and other necessary expenses of the Section. This is a small amount. It is not that one hasn't the money that every one hasn't already sent the fifty cents. It is a matter of taking the trouble. As Secretary-Treasurer, I urge you, fellow teachers, to co-operate with us by taking this amount of trouble to help the cause along. We need the money right now.

In one of his private communications to us Professor Smith used a very happy phrase to describe the spirit which should impel the mathematics teachers to co-operate in every possible way. The phrase was "being loyal to our subject."

THE MATHEMATICAL MEETINGS AT NASHVILLE DECEMBER, 1927

By H. E. SLAUGHT
Professor of Mathematics, University of Chicago

The Mathematical Association of America and the American Mathematical Society will hold a series of meetings at Nashville during the holiday season which should be of vital interest to every teacher of mathematics in the South. This is the first occasion when these national meetings have been held at a point as far south as Nashville. Furthermore, additional interest attaches to this series of meetings because of the fact that the American Association for the Advancement of Science will be holding their sessions at Nashville at the same time. This is the largest scientific organization in the country and has affiliated with it practically every national scientific society. The total attendance will probably be between three thousand and four thousand, and by reason of such large numbers, there will be granted reduced rates from all parts of the country to Nashville.

The program of the Mathematical Association of America, December 29-30, will include papers by:

Prof. Archibald Henderson, University of North Carolina, "*Observations on Simultaneous Equations.*"

Prof. Jewell Hughes, University of Arkansas, "*Mathematics in the Junior Colleges.*"

Prof. J. Arthur Harris, University of Minnesota, "*The Fundamental Mathematical Requirements of Biology.*"

Prof. William Betz, Vice-President, East High School, Rochester, N. Y., "*The Reorganization of Secondary Mathematics.*"

Prof. E. P. Lane, University of Chicago, "*Present Tendencies in Projective Geometry.*"

Prof. A. R. Crathorne, University of Illinois, "*The Law of Small Numbers.*"

Prof. J. W. Lasley, Jr., University of North Carolina, "*Application of Vectors to the Formation of the Roots of the Cubic.*"

The American Mathematical Society will hold sessions, December 28-29, for the reading of scientific contributions in mathematics, and in particular there will be several public lectures, including:

The Josiah Willard Gibbs Lecture, "*Resonance in the Solar System,*" by Professor E. W. Brown, Yale University.

"*Mathematical Rigor, Past and Present,*" by Professor James Pierpont, Yale University.

"*The Notion of Probable Error in Elementary Statistics,*" by Professor E. V. Huntington, Harvard University.

"*The Human Significance of Mathematics,*" by Professor Dunham Jackson, University of Minnesota.

"*Some Philosophic Aspects of Mathematics.,*" by Professor Arnold Dresden, Swarthmore College.

It will thus be seen that a large variety of mathematical contributions will be made which should

attract the attention and interest of everybody interested in mathematics whether in high school, college, or university. This is a fine opportunity for people of the southern part of the United States to participate in the interest and enthusiasm of such meetings.

FRESHMAN MATHEMATICS IN THE LAST FORTY YEARS

By W. PAUL WEBBER,
Louisiana State University.

To say that America has any clearly defined educational objective other than to make it possible for more and more to carry away diplomas would be claiming too much. The recent efforts to eliminate or to sterilize mathematics is only one of many evidences on the subject. It all comes in the course of evolution, with little competent forethought on the part of our "Educators". Some evidence of the general trend of the last forty or fifty years can be obtained from a cursory examination of some typical text books on college algebra. In the text I studied nearly forty years ago, eighty-six pages are devoted to elementary algebra with long lists of fairly stiff exercises. This was followed by fifty-six pages on quadratic equations in their various phases including two and three unknowns. The exercises contained some quite fancy forms. In the pages that followed were treated: imaginaries; inequalities; ratio; proportion and variation; binomial theorem; progressions; logarithms; interest and annuities; choice, chance; scales of notation; number theory; method of differences; infinite series; determinants and finally, a hundred and nine pages on the theory and solution of higher equations. All this was to be presented to and digested by freshmen. In my own case it was fairly well done, and I think more than half my class-mates did as much. We worked, however, and did not spend a lot of time "pressing brick" or holding down stone steps. In this generation the finger of scorn would be pointed at us and we would be ostracized if not persecuted on the campus. The text above cited contained almost five hundred pages and was edited and printed in America. A hundred or more recitation hours were given to this book.

Witness our educational progress by examining, now, a very recent text. The review of elementary algebra, introduction to graphs, quadratic equations, use of the derivative in curve tracing and in problems on maximum and minimum, and solution of higher equations, are all covered

in less than one hundred pages. Then follow brief treatments of variation with the addition of some introduction of the function idea; progressions; logarithms; and some other topics of the usual type. The entire book is less than half the size of the one first cited.

Within this forty-year period came a movement called unified mathematics. Several texts were published along this idea. Some of these were quite successful and some are now in use in various institutions. Many teachers could not see the idea of a one-book course covering the essentials of algebra, trigonometry, analytics and some calculus. They imagined something was wrong. They still insist on a three-book course. But, what has happened? Well, the recent algebras are very much like the unified courses except that they are less extensive and, being called algebra, they get by. The unified notion has distinctly flavored the course, but in itself was too rapid a change for skilled educators to recognize. In the high schools the unified course seems to have made better progress.

Nothing need be said about trigonometry. It is either so perfectly edited in its present form as to admit of no improvement or else no one has the ingenuity to make suitable changes.

As for analytics, some little progress in the use of the derivative has been made and a few texts have gotten away from the notion that the course should be merely an elementary treatment of conics and a few higher curves.

I venture to suggest that more continuity in the use of analytic methods including the derivative and its applications is desirable. My experience with the above cited modern text on college algebra long ago convinced me that it is better as a preparation for calculus considering the short time allowed it than the older type.

Where evolution is taking us ultimately, I cannot say. But at present, for convenience of reference and continuity of training in analytic methods throughout the first year a one-book course for the freshmen year has advantages. Possibly some one may yet contrive to acceptably construct and edit such a convenience. Time will tell.

It seems to me that what may be called an elementary, or, better, an introductory course in mathematical analysis carried on with a minimum of interruption throughout the freshman year and contained in the second year with wider applications in what is ordinarily called calculus seems desirable. Tables of squares, cubes, square roots and cube roots would add much to the convenience of the work in algebra, analytics, and calculus.

THE STRAIGHT LINE IN PLANE ANALYTICS

By H. L. SMITH,
Louisiana State University

In the present paper is given a treatment of the straight line in plane analytics which is both simple and rigorous.

1. *A condition that the line P_0P_1 be perpendicular to the line P_0P_2.* Let P_0, P_1, P_2 be the points (x_0y_0), (x_1y_1), (x_2y_2)respectively. Set

(1) $$h_1=x_1-x_0,\ k_1=y_1-y_0,\ h_2=x_2-x_0,\ k_2=y_2-y_0.$$

Then if D_{10}, D_{20}, D_{12} are the distances between P_1 and P_0, P_2 and P_0, P_1 and P_2, respectively,

(2) $$D_{10}^2=h_1^2+k_1^2,\ D_{20}^2=h_2^2+k_2^2,\ D_{12}^2=(h_1-h_2)^2+(k_1-k_2)^2.$$

But by plane geometry P_0P_1 is perpendicular to P_0P_2 if, and only if,

(3) $$D_{10}^2+D_{20}^2=D_{12}^2,$$

that is, by (2), if, and only if,

(4) $$h_1^2+k_1^2+h_2^2+k_2^2=(h_1-h_2)^2+(k_1-k_2)^2,$$

which reduces to

(5) $$h_1h_2+k_1k_2=0.$$

Hence by (1) we have proved

THEOREM 1. *The line P_0P_1 is perpendicular to the line P_0P_2 if, and only if,*

(6) $$(x_1-x_0)(x_2-x_0)+(y_1-y_0)(y_2-y_0)=0.$$

2. *Two-point equation of the straight line.* Let P_0P_1 be as above and P,Q be the points $(x,y),(x_0-y_0+y_1,x_0-x_1+y_0)$ respectively. Then by Theorem 1 P_0Q is perpendicular to P_0P_1. Hence P is on the line P_0P_1 if, and only if, P_0P is perpendicular to P_0Q, that is, by Theorem 1, if, and only if,

(7) $$(y_1-y_0)(x-x_0)-(x_1-x_0)(y-y_1)=0.$$

We have thus proved

THEOREM 2. *The point $P(xy)$ is on the line determined by $P_0(x_0y_0)$ and $P_1(x_1y_1)$ if, and only if,*

(8) $$(y_1-y_0)(x-x_0)=(x_1-x_0)(y-y_0).$$

3. *Point-direction equation of the straight line.* By Theorem 2 the equation $a(x-x_0)+b(y-y_0)=0$ represents the line through the points $P_0(x_0y_0)$, $P_1(x_0-b,\ y_0+a)$. Now let Q, M be the points (a,b), (x_0+a,y_0+b) respectively. We then find the mid-point of $O(00)$ and M to be $((x_0+a)/2,(y_0+b)/2)$ and the mid-point of Q and P_0 to be the same point. Hence P_0M is parallel (properly or improperly*) to OQ. Hence since also by Theorem 1 P_0P_1, is perpendicular to P_0M, we have

*We here make the useful convention that a line is improperly parallel to itself.

THEOREM 3. *The point $P(xy)$ is on the line through $P_0(x_0y_0)$ perpendicular to the line determined by $O(00)$ and $Q(ab)$ if, and only if,*

$$a(x-x_0)+b(y-y_0)=0. \tag{9}$$

4. *The general linear equation.* We now prove

THEOREM 4. *If O, Q are the points (00), (ab) respectively then the locus of points $P(xy)$ such that*

$$ax+by+c=0 \tag{10}$$

is the straight line which is perpendicular to the line OQ and which passes through the point $(-ac/r^2, -bc/r^2)$, where $r=\sqrt{(a^2+b^2)}$.

This theorem follows from (9) since (10) can be put into the form

$$a(x+ac/r^2)+b(y+bc/r^2)=0.$$

5. *Parallel and perpendicular lines.* From Theorem 1, 2 and 4 now follows

THEOREM 5. *The lines*

$$a_1x+b_1y+c_1=0,\quad a_2x+b_2y+c_2=0$$

are perpendicular if, and only if,

$$a_1a_2+b_1b_2=0; \tag{11}$$

they are parallel (properly or improperly) if, and only if,

$$a_1b_2-a_2b_1=0. \tag{12}$$

6. *Parametric equations.* We next prove

THEOREM 6. *The point $P(xy)$ is on the line through the point $P_0(x_0y_0)$ parallel (properly or improperly) to the line through $O(00)$ and $Q(ab)$ if, and only if, there is a number t such that*

$$x=x_0+at,\quad y=y_0+bt. \tag{13}$$

To prove this we note first that by Theorem 5 and Theorem 3,

$$b(x-x_0)-a(y-y_0)=0 \tag{14}$$

is a line through P_0 parallel to OQ.

Now if there is a t such that (13) holds, then (14) also holds; which proves the first part of the theorem. Also if (14) holds, then there is a t such that (13) holds. For a and b are not both zero; suppose b is not zero, and take $t=(y-y_0)/b$, so that $y=y_0+bt$. If this value of y is now substituted into (14) there results $x=x_0+at$, which proves the second part of the theorem.

From Theorems 6 and 4 follows

THEOREM 7. *The point $P(xy)$ is on the line $ax+by+c=0$ if, and only if, there is a number t such that*

$$x=-ac/r^2+bt,\quad y=-bc/r^2-at. \tag{15}$$

COROLLARY. *The point P is on the above line if, and only if, there is an number s such that*

$$x=-\ ac/r^2+(b/r)s,\quad y=-bc/r^2-(a/r)s. \tag{16}$$

7. *Distance from a point to a line.* Consider the fixed point $R(pq)$ and the fixed line l: $ax+by+c=0$. Let $P(xy)$ be any point on l. Then by the corollary to Theorem 7 there is a number s such that

(16) holds. We seek a value of s such that D, the distance between P and R, shall be a minimum (as P varies).

We have

$$D^2=(x-p)^2+(y-q)^2=[p+ac/r^2-(b/r)s]^2+[q+bc/r^2+(a/r)s]^2,$$

so that

$$D^2=s^2+2As+B, \tag{17}$$

where

$$A=(aq-bp)/r, \tag{18}$$

$$B=(p+ac/r^2)^2+(q+bc/r^2)^2 \tag{19}$$
$$=p^2+q^2+2c(ap+bq)/r^2+c^2/r^2.$$

But by (17),

$$D^2=(s+A)^2+(B-A^2).$$

Hence the smallest value of D^2 is $D_0^2=B-A^2$, which is assumed when $s=-A$.

Now by (18), (19),

$$D_0^2=H+2c(ap+bq)/r^2+c^2/r^2, \tag{20}$$

where

$$H=p^2+q^2-(aq-bp)^2/r^2$$
$$=[p^2r^2+q^2r^2-(a^2q^2-2abpq+b^2p^2)]/r^2$$
$$=(a^2p^2+2abpq+b^2q^2)/r^2$$
$$=(ap+bq)^2/r^2.$$

If now this value of H is put into (20), there results

$$D_0^2=(ap+bq+c)^2/r^2,$$

so that

$$D_0=|ap+bq+c|/r.$$

Now let $P_0(x_0y_0)$ be the point on l for which $s=-A$ so that D_0 is the distance between P_0 and R. Then

$$x_0=-ac/r^2-(b/r)A=(-ac-abq+b^2p)/r^2,$$
$$y_0=-bc/r^2+(a/r)A=(-bc+a^2q-abp)/r^2,$$

and hence

$$x_0-p=-a(ap+bq+c)/r^2,\quad y_0-q=-b(ap+bq+c)/r^2,$$

so that

$$b(x_0-p)-a(y_0-q)=0.$$

Thus P_0 is the intersection of l with the line through R perpendicular to l. We have thus proved

THEOREM 8. *If P_0 is the point in which the perpendicular from the point $R(pq)$ to the line l: $ax+by+c=0$ cuts the line l, then D_0, the distance between P_0 and R, is given by*

$$D_0=|ap+bq+c|/r.$$

Moreover if P is any other point on l, then the distance between P and R is greater than D_0.

CORRESPONDENCE

September 26, 1927.

My dear Professor Sanders:

I am very glad to know that the members of the Louisiana-Mississippi Section are so interested in the Council and are actively promoting the organizaion.

The Council printed five thousand copies of the Second Yearbook, entitled *"Curriculum Problems in Teaching Mathematics."* At present four thousand copies have been sold. I should like to urge all members who have not yet secured their copies, to order them soon from the Teachers College Bureau of Publications, 525 West 120th Street, New York, before the supply is exhausted. No more will be printed. These books may be secured in paper binding for $1.25, or in cloth binding for $1.50.

The Third Yearbook, which will be ready in February, 1928, will deal with the *"Teaching of Significant Topics in Mathematics"*. Dr. Clark and Dr. Reeve are the editors.

I hope that the Louisiana-Mississippi Branch will send one or more delegates to the Council meeting to be held February 24 and 25, 1928, at Hotel Statler, Boston Massachusetts. The general theme is to be *"Mathematics in Modern Life"*.

Best wishes for a successful school year

Cordially yours.

MARIE GUGLE,
President of the Council.

November 15, 1927.

Prof. S. T. Sanders.
Baton Rouge, La.

Dear Professor Sanders:

Your favor of November 9th advising me that the next meeting of the Louisiana-Mississippi Section of the Mathematical Association of America will be in Jackson, Miss., in March, 1928, has been received. Your kind invitation to prepare a paper for this occasion is duly appreciated. I think at the present time I will be able to comply with your request and shall look to that end, though this is our legislature year and we never know just what demand will be made upon us at the time legislature meets. You are certainly to be congratulated upon the great interest you are developing in the field of mathematics, both with the teachers of mathematics in the colleges and secondary schools as well as advanced students of mathematics in research lines. The influence of this association for increased mathematical interest is being felt throughout this State and it is my pleasure to cooperate with you and assist you in any way I can, so you can place my name on the program for the March meeting.

I am with great respect.

Yours very truly,
B. M. WALKER, *President*,
Mississippi A. & M.

November 10, 1927.

Professor P. K. Smith,
Hattiesburg, Mississippi.

My dear Professor Smith:

I presume that through Professor Sanders or you I am in receipt of No. 1, Volume 2, of the MATHEMATICS NEWS LETTER, of the Louisiana - Mississippi Branch of the National Council of Teachers of Mathematics. I want to congratulate you on

your association and the work that you are doing. The National Council is anxious in every way to cooperate with organizations like yours, and in order that we who are responsible for the success of the *Mathematics Teacher* may not lose sight of what you are doing, I am inclosing fifty cents in stamps to pay for a full year's subscription to your Council News Letter.

Yours very truly,

W. D. REEVE,

Professor of Mathematics, Teachers' College, Columbia University.

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The Mathematics News Letter

is published in the interest of the Louisiana-Mississippi Section of the Mathematical Association of America and the Louisiana-Mississippi Branch of the National Council of Teachers of Mathematics, and is now being sent to the mathematics teachers in both college and high schools throughout Louisiana and Mississippi, all of the principals and school heads in these two States, to the superintendents—in fact a copy reaches every high school and college in Louisiana and Mississippi—and it is now in it's second year.

In order to help finance the publication and distribution of the **Mathematics News Letter,** we have thought it advisable to carry a few select advertisements, and are appealing only to the advertiser with school material to sell, who can appreciate the fact that *their ad will be read by every school head, principal, superintendent, mathematics teacher, (besides many others interested in mathematics) throughout the States of Louisiana and Mississippi.*

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BATON ROUGE, LA.

S. T. SANDERS, *Chairman.*